

Attachment

7

***Stormwater Flood Management Grant Proposal
Lower Silver Creek, Reaches 4-6, and Lake Cunningham Project
Flood Damage Reduction Costs and Benefits***

Attachment 7 consists of the following items:

- ✓ **Flood Damage Reduction Costs and Benefits.** Attachment 7 provides estimates for the flood damage reduction costs and benefits of the Lower Silver Creek, Reaches 4-6, and Lake Cunningham Project.
- ✓ **Appendix 7A.** This appendix contains source information used by the District to quantify the avoided costs associated flood damage up to the 100-year event.

Flood Damage Reduction Costs and Benefits

The Lower Silver Creek (Reaches 4-6) and Lake Cunningham Flood Protection Project (Project) is jointly proposed by the Santa Clara Valley Water District (District) and the Natural Resources Conservation Service (NRCS), an agency within the U.S. Department of Agriculture (USDA). The Project is part of the District's larger Coyote Watershed Program (CWP) - a \$400-million program of flood protection improvements within the Coyote Watershed with the goal of improving natural stream functions and environmental benefits of creeks. The discounted Project cost is \$48,553,700 as presented in Table 10. The expected flood damage reduction benefit of the Project is 100-year flood protection for 3,800 parcels, including many parcels in disadvantaged communities. The present value of future expected benefit is \$49,683,400 and is quantified in Table 12 (see Appendix 7A-1).

This attachment provides the estimates for the flood damage reduction costs and benefits. The Project will provide 100-year flood protection to northeastern portions of the City of San Jose (City) and reduce flood damage costs to the region. Additionally, the Project will improve access to the creek channel, which in turn, will enhance maintenance activities to maintain the channel's engineered capacity. The Project consists of two components: 1) completion of Reach 4 through 6; and 2) design and construction of improvements for Lake Cunningham.

Project Description

Historically, the floodwaters from Lower Silver Creek have inundated the areas adjacent to the creek and westerly to the Bayshore Freeway causing considerable damage to homes and businesses. The Project will remove approximately 3,800 parcels that are subject to flooding from the 100-year flood plain. The Project is part of the District's larger Coyote Watershed Program (CWP) - a \$400-million program of flood protection improvements within the Coyote Watershed with the additional goal of improving natural stream functions and environmental benefits of creeks. Originally, the NRCS, initiated design and construction for Reaches 1-3 of Lower Silver Creek, from its confluence at Coyote Creek to Interstate 680 (I-680). Construction of Reaches 1-3 was completed in 2006. Although designs were nearly complete for Reaches 4-6 at that time, funding limitations required that the Project be put on hold. Work on Reaches 4-6 and Lake Cunningham must be completed in order to protect the 3,800 properties within the current Federal Emergency Management Agency (FEMA) 100-year flood zone of Lower Silver Creek. Figure 3-3 in the Work Plan (p. 3-2) illustrates the



Figure 7-1. Artist rendering of proposed Lower Silver Creek, Reach 5, improvements.

Project's geographical location, creek reaches, Lake Cunningham, and the surrounding area.

Given that the improvements for Reaches 4-6 and Lake Cunningham are at differing stages of engineering design, the Project is sub-divided into two main components – Project Component 1 and Project Component 2.

Project Component 1 consists of improvements to Reaches 4-6. This component will include channel improvements including floodwalls, a gravel maintenance road, a sediment transport channel, a Shaded Aquatic Riverine (SAR) habitat bench, and landscaping and irrigation. A brief summary of Reaches 4-6 is provided below along with indication description of the level of engineering design and construction completed to date.

- *Reach 4* begins at the upstream side of Interstate 680 and extends 0.7 miles to North Babb Creek. The design for Reach 4 was completed in June 2010 with construction starting in August 2010. As of March 2011, approximately 25% of this reach has been constructed with the remaining portions of this reach considered “shovel-ready.”
- *Reach 5* begins at the confluence with North Babb Creek and extends 0.6 miles to the confluence with South Babb Creek. The design for Reach 5 was completed in June 2010 with construction starting in August. As of March 2011, approximately 5% of this reach had been constructed with the remaining portions of this reach considered “shovel-ready.”
- *Reach 6* begins at the confluence with South Babb Creek and extends 0.8 miles to Cunningham Avenue. The design for Reach 6A (South Babb Creek to Moss Point Drive) was completed in June 2010; however, construction was not started due to funding availability. Reach 6A is considered “shovel-ready.” As of December 2010, Reach 6B (from Moss Point Drive to Cunningham Avenue) was at the 60% design stage.

Project Component 2 consists of capacity and conveyance improvements to Lake Cunningham, a large storage area where Flint, Ruby, and Lower Silver/Thompson Creeks confluence to form Lower Silver Creek. Lake Cunningham primarily functions as a flood detention facility intended to attenuate peak runoff from above creeks and was constructed in the late-1970s. The improvements being considered for Component 2 include reconstructing a portion of the roadway surrounding the lake on the north side of the park and constructing a new control to span Lower Silver Creek. The roadway currently functions as an inlet weir to control overflow from Lower Silver Creek (which flows around the perimeter of the park) and, therefore, a new control structure is necessary to ensure proper operation of the lake inlet weir. Detailed engineering on the capacity improvements for Lake Cunningham will begin in September 2011 with construction commencing in 2013.

Description of Project Relationship to Bay Area Integrated Regional Water Management Plan

The Project is consistent with the Bay Area Integrated Regional Water Management Plan (IRWM Plan) as it contributes to the IRWM Plan goal of protecting of public health, safety, and property. The IRWM Plan identifies several objectives that the Project accomplishes along with the main project goal. Four objective of the IRWM Plan highlight the importance of flood damage reduction and they include managing floodplains to reduce property damage, effective management of flood-prone areas, maintaining flood protection and stormwater facilities, and securing funding for such objectives. Table 7-1 provides the specific Project goals and objectives.

Table 7-1. IRWM Plan Goal and Objectives

IRWM Plan Goal	IRWM Plan Objectives
Contribute to the protection of public health, safety, and property	Managing floodplains to reduce flood damages to homes, businesses, schools, and transportation
	Achieving effective floodplain management by encouraging wise use and management of flood-prone areas
	Maintaining performance of flood protection and stormwater facilities
	Securing funds to implement solutions

Description of Project Economic Costs

The discounted Project cost is \$48,553,700 and is presented in Table 7-2 (see Table 10 of Appendix 7A-1). The project costs include all costs that will be incurred to implement and operate the project and to achieve benefits from the project. Costs funded by local, State, federal agencies and non-profits are included.

All costs incurred prior to September 31, 2008 were not factored into the total cost. Reaches 1-3 were constructed in 2001 through 2006 and, for this reason, are not considered in this cost estimate. Likewise, the benefits of Reaches 1 – 3 are not considered in this Project. These reaches, by themselves, do not provide sufficient enough protection from the 100-year flood event to support a Letter of Map Revision (LOMR). The benefit of 100-year flood protection for the approximately 3,800 parcels within the 100-year flood zone can only be realized with the completion of Reaches 4 – 6 of Lower Silver Creek and around Lake Cunningham.

The Project costs are detailed in Appendix 4A and include the following: (4A-1) NRCS Grant Agreement contains ARRA information), (4A-2) “SCWWD Financial Report” Report, (4A-3) the RMC Contract for Program Management Services and Design, (4A-4) Preliminary Cost Estimates for Lake Cunningham, and (4A-5) “Budget Calculations”.

Cost Details

Tables 5, 6 and 7 (see Attachments 4A-1 through 4A-5) provide details regarding the costs of final design for both components. Total Project costs are estimated at \$54,992,397. Direct administration costs are \$909,983. Land purchase and easement costs are \$210,860. The District has identified costs of \$5,002,105 for final design, engineering, and environmental documentation. These costs would generally be applied to engineering design, planning, and environmental compliance services. Construction costs are esteemed at \$42,842,141 and cover the implementation of construction activities for Components 1 and 2 of the Project. Environmental compliance, mitigation and enhancement activities are expected to cost \$1,169,290. Costs included under this task include, but are not limited to, biological monitoring, compliance with noise reduction measures, the preparation of stormwater pollution prevention plans, dust control mitigation, and hazardous materials contingencies. The allocated costs also are intended to cover any other environmental compliance and mitigation activities that have yet to be identified. Construction administration and outreach is estimated to be \$2,074,231 with other costs such as permitting, legal costs, and licenses to cost \$80,103. A construction contingency of \$2,703,683 is included in the budget.

Table 10 in Appendix 7A-1 illustrates the annual cost of the Project over the next 50 years discounting future expenditures to allow an analysis of cost in present values terms. It will take approximately four

years to complete construction with a total capital expenditure of \$55,000,000¹ as seen in column (a). Upon completion of the Project there will be annual operation (c), maintenance (d), and replacement (e) costs of \$100,000, \$75,000, and \$25,000 respectively for the remaining 46 years. The initial annual capital expenditures and the annual operation, maintenance, and replacement costs are totaled in column (g) then discounted annually at a 6% discount rate represented as an annual discount factor in column (h). Column (i) shows the present value of the annual costs associated with the project totaling \$48,553,700.

Cost figures are based on numbers from the 1983 EIS/EIR (see Table N, p. 65, in Appendix 7A-2). This document estimates installation costs of the Project at \$13,954,000. These costs include the following: acquisition of necessary permits, licenses, and other entitlements, acquisition of all land rights, administration of all land rights contracts; design, installation and modification of all road crossing and relocation of utilities; inspection of road crossing construction; operation and maintenance on the channel, mitigation plantings, and nonstructural measures; irrigation of plantings until able to survive without supplemental irrigation; and other miscellaneous costs (see Tables 1 and 2 in Appendix 7A-2).

Consistency – The economic analysis is consistent with the grant requirements, uses the total project costs as provided in Attachment 4, and is based on the flood protection benefits as originally provided in the 1983 EIR/EIS and updated again in 2001 with the Watershed Supplement.

With-Project and Without-Project Comparison – The economic analysis provides the cost and benefits for the with- and without-project conditions through 2060. The costs are provided in **Table 7-2** and show a new annual damage benefit of \$3,152,500 for the with-project conditions.

Table 7-2 shows the monetary benefits associated with the Flood Damage Reduction Project over the next 50 years in present value terms. The Expected Annual Damage Without-project in row (a) takes into consideration the annual impact and costs associated with flood waters on buildings, vehicles, transportation disruptions, emergency services and overbank deposition totaling an annual cost of \$3,540,000. Upon the completion of the project row (b) shows how the annual cost associated with flooding would be greatly reduced to a value of \$387,500. The difference between the value in row (a) and row (b) is the expected annual benefit of the project which is seen in row (c) as \$3,152,500. The expected annual benefit over a 50 year period is discounted at a 6% discount rate, which is represented in row (d) as a present value coefficient of 15.76. Row (e) shows multiplications of the Expected Annual Damage Benefit (c) by the Present Value Coefficient (d) equating the Present Value of Future Benefits to \$49,683,400.

Table 7-2. Present Value of Expected Annual Damage Benefits (2009 dollars)

Project: Lower Silver Creek Watershed Project			
(a)	Expected Annual Damage Without Project ⁽¹⁾		\$3,540,000
(b)	Expected Annual Damage With Project ⁽¹⁾		\$387,500
(c)	Expected Annual Damage Benefit	[a - b]	\$3,152,500
(d)	Present Value Coefficient ⁽²⁾		15.76
(e)	Present Value of Future Benefits	[c x d]	\$49,683,400
Notes: From Table 10 in Appendix 7A-1.			
(1) The program assumes no population growth thus EAD will be constant over analysis period.			
(2) 6% discount rate; 50-year analysis period.			

Period of Analysis – The construction costs in Table 10 consider the Project lifecycle in terms of continuing construction from 2010 through 2014. The operational life of the Project is 60 years.

¹ Rounded from \$49,683,400.

Economic Cost – the economic cost of the total Project as presented in Attachment 4 considers all reasonably foreseeable costs including opportunity costs.

Sunk Costs – Sunk costs considered as part of the economic analysis but not factored into the total Project costs include the planning, design and construction costs completed for reaches 1 – 3. Construction of these reaches was completed in 2006.

Opportunity Costs – All opportunity costs are accounted for including previous construction costs incurred since October 2008 and engineering costs for reaches 4 – 6a.

Discount Rate – The Discount rate applied was 6 percent.

Dollar Value Base Year – all costs reflected in the total project costs in attachment 4 are expressed in 2009 dollars. Likewise, all flood damage avoidance benefits were converted to and express in 2009 dollars.

Project Flood Damage Reduction Benefits

The expected flood damage reduction benefit of the Project is 100-year flood protection for 3,800 parcels, including many parcels in disadvantaged communities. The present value of future expected benefit is \$49,683,400 as quantified in Table 12. These benefits are derived from two sources. Benefits identified in the “Lower Silver Creek Final Watershed Plan and Environmental Impact Report/Environmental Impact Statement (EIR/EIS), Santa Clara Valley Water District and NRCS, July 1983” (Appendix 3A-2), Table 5 were later recalculated based on information from the “Supplemental Watershed Plan, Lower Silver Creek, SCVWD and NRCS, January 2001, Table A (p. 15) (Appendix 3A-12). The present value of future expected benefit value of \$49,683,400 was derived by applying update factors (Table 9) to Table 5 numbers from the 1983 EIR/EIS.

Estimates of Historical Flood Damage Data

The 1983 EIR/S concluded that there existed a serious threat of loss of life because officials would have limited time (estimated to be a one-hour period) to notify residents in this highly urbanized area. The problem is compounded by the fact that many residents in the floodplain are unaware of the flood risk and will be less likely to evacuate at the first signs of impending danger.

There are numerous expected flood damage reduction benefits of the Project including avoided physical damage to buildings and infrastructure, and transportation disruptions. Other benefits including habitat restoration, improved trail connectivity, improved water quality, and improved fish habitat have not been quantified. Additional detail for each of the quantified benefits include:

- **Buildings** – the 1983 EIR/S noted that channel modifications are not currently sufficient to prevent extensive flooding from larger, more infrequent storms. The impact of large storms has been compounded due to the large amount of development in the floodplain over the last three decades. Total damages from a 100-year flood, to buildings and contents alone, in 1983 were calculated to be at \$26,818,100 (Table A, Appendix 3A-2, Lower Silver Creek Final Watershed Plan and Environmental Impact Report/Environmental Impact Statement (EIR/EIS), Santa Clara Valley Water District and NRCS, July 1983, page 15). The 1983 EIR/EIS estimated 3,787 buildings were at risk including residential (including yards and outside improvements), commercial, industrial, churches and schools (p. 28).
- **Infrastructure** – Sediment deposition would occur on many of the roadways, necessitating lengthy and expensive cleanup activities. In many areas, this sedimentation would be only minor (1 inch or less) at the 100-year event. However, in ponded areas where sediment would have the opportunity to deposit, such as on Capitol Expressway at the intersection with Interstate 680, and at the intersection of McKee and King roads, sediment depths would range from 3 to 6 inches. The average annual clean-up costs were estimated to be \$13,900 in the 1983 Lower Silver Creek Final Watershed Plan and Environmental Impact Report/Environmental Impact Statement (EIR/EIS), Santa Clara Valley Water District and NRCS. In 2009 dollars, that amount would be \$25,000. In terms of transportation system disruptions – the 1983 EIR/S concluded that major traffic routes would be subject to closure

thereby limiting many emergency services such as fire, police, and medical.

Estimates of existing without-project conditions

Estimates of existing without project conditions are found in the “Supplemental Watershed Plan, Lower Silver Creek, SCVWD and NRCS, January 2001, Table A (p. 15) (Appendix 3A-12)”. Without the Project, properties within the 100-year flood zone would continue to remain susceptible to flooding during the 10, 25, 50, and 100 year flood events.

Estimates of existing with-project conditions

The benefits of the with-project condition would entail a substantially reduced area subject to flooding during the 100-year flood event. The area expected to receiving these benefits comprising approximately 1,350 acres of mostly developed land.

Description of methods used to estimate without- and with-project conditions

The general methodology applied for the economic analysis included inventorying existing structures within the delineated 100-year flood plain for Lower Silver Creek. With-Project conditions assume the removal of these areas from the 100-year flood zone following implementation of the Project. Although the original structural inventory occurred back in 1983, the area under consideration was already build out and, therefore, the conditions in 2009 are not substantially different from 1983 in terms of the structures potentially affected by the 100-year flooding event. The without-Project conditions assume that these improvements would not occur and the structures currently subjected to flooding damages would continue to be at risk in the future.

Description of the distribution of local, regional, and statewide benefits, as applicable

Regional benefits will be distributed to the local community within the City of San Jose, including economically disadvantaged communities (see Attachment 9, Other Benefits). In addition, there will be reduction of flood flows to nearby Coyote Creek (see Attachment 3, Figure 3-4, p. 3-9).

Identification of beneficiaries

Buildings in the 100-year floodplain will be the beneficiaries of the Project. The approximate numbers include: 3,420 residential houses, 141 residential apartments, 155 commercial buildings, 34 industrial buildings, and 37 schools and churches.

When the benefits will be received

Benefits will be received during various flooding events upon completion of the Project in 2014. All benefits will be realized with the first 100-year flood event.

Uncertainty of the benefits

There are some uncertainties with the benefit estimates as they are derived from the 1983 EIR/EIS Report (Lower Silver Creek Final Watershed Plan and Environmental Impact Report/Environmental Impact Statement (EIR/EIS), Santa Clara Valley Water District and NRCS, July 1983) and updated in 2001. These uncertainties center around the current value(s) of the real estate inventoried and the presence of additional, unaccounted structures that may also be subject to flooding. In addition, future funding for maintenance could be subject to budget shortfalls. Also, there is some uncertainty regarding Lake Cunningham recreational uses as the nature of the facilities could be reduced as additional coordination will be forthcoming as the Project advances. Finally, the existing MOU between the City and the District may need to be updated for coordination of the improvements to Lake Cunningham.

Description of any adverse effects

There could be temporary impacts to habitat due to in-channel construction activities during the four year Project construction time frame. Another potential adverse effect could be noise produced during construction; however, this impact was addressed in the 1983 EIR/EIS and readdressed in subsequent environment documents in 1998, 2001, and 2004 (see appendices 3A-1, 3A-3 3A-7, 3A-8 3A-9 3A-15).

Steps to Determine Flood Damage Reduction Benefits

Flood damage benefits are expressed in terms of expected annual damage (EAD). EAD is the damage that could be expected to occur in any given year taking into account all types of flood events. The differences in the total present value of EAD between without- and with-project conditions over the project life cycle provide an estimate of the Project benefits which have then been compared to the total present value of costs of the proposed project to determine net benefits or a benefit-cost ratio. The EAD for the Project is provided in Table 7-3.

Table 7-3. Present Value of Expected Annual Damage Benefits (2009 dollars)

	Annual EAD (2000 dollars)		Annual EAD (2009 dollars)	
	Without Project	With Project	Without Project	With Project
Flood Water Damage				
Buildings and Improvements	\$2,328,000	\$230,000	\$2,910,000	\$287,500
Vehicles	\$ 429,000	\$66,000	\$536,250	\$82,500
Transportation Disruption	\$30,000	\$10,000	\$37,500	\$12,500
Emergency Services	\$25,000	\$4,000	\$31,250	\$5,000
Sediment – Overbank Deposition	\$20,000	--	\$25,000	--
Total			\$3,540,000	\$387,500
Source: Watershed Plan Supplement, 2001; NRCS, 1983, DWR, 2011				
Note: From Table 5 in Appendix 7A-1.				

Identify three flood events for which flood conditions and associated flood damage will be different for without- and with-project conditions

For two events, the 10 year, 100-year flooding would be avoided with the Project. The 500-year event would be reduced.

Determine the area affected by flooding for the identified flood events for without-project conditions

The area affected by flooding includes 3,800 parcels and comprises approximately 1,350 acres of land area.

Probability of failure of flood management structures for without-project conditions

The main structural feature is a culvert at Cunningham Avenue. Probability of failure information by event is not available but current hydraulic modeling indicates that Lake Cunningham will spill to the south due to the capacity restriction at Lake Cunningham. The Project proposes to remove this to minimize the likelihood for failure.

Estimate the number and values of structures affected by flooding by each event

Under current conditions, up to 3,800 structures are susceptible to flooding during the 100-year storm event. Approximately 1,400 of these structures would be seriously damaged (e.g. total loss). Table E in appendix 7A-1 provides the value for properties affected during other flood events, including the 5, 10, 25, 100, and 500 year flood events.

Flood damage without-Project conditions for each event

Table A in Appendix 3A-1 provides estimates for flood damage for the 5, 10, 25, 100, and 500 year flood

events. These values are in 1983 dollars.

Area affected by flooding for identified flood events for existing and future with-Project conditions

Under existing conditions, the area susceptible to flooding is at risk during the 10, 50, and 100-year storm events. Under the Project, areas currently subject to inundation would be protected up to the 100-year storm event. This area is estimated at approximately 1,350 acres.

Estimate number of and values of structures affected by flood by each event for existing and future with-Project conditions

Table A in Appendix 3A-1 provides estimates for flood damage for the 5, 10, 25, 100, and 500 year flood events. These values are in 1983 dollars. As provided, up to 1,412 structures could be subjected to flooding in excess of two feet.

Probability of failure of flood management structures for with-project conditions

The Project would improve existing flood control facilities for Lake Cunningham by creating additional flood storage capacity. The existing culvert at Cunningham Avenue would be replaced and the capacity increased to facilitate the safe passage of the design storage event to downstream reaches of Lower Silver Creek. The perimeter levee at Lake Cunningham would be improved, as necessary, to meet the specified design criteria, including the Army Corps of Engineers' levee criteria. Therefore, minimal threat of levee failure would be associated with the Project condition.

Calculate expected annual flood damage as described below for without- and with-project conditions

These benefits are described in the preceding subsections and summarized in Table 7-3 (see Table 5 in Appendix 7A-1).

Calculate the expected annual flood damage reduction benefit as described below.

These benefits are described in the preceding subsections and summarized in Table 7-2 (see Table 12 in Appendix 7A-1).